


Dehn's Redhead Points to deal with.

1. ~~Broken arguments~~ against conventionalism.
2. acceleration v. G.F.
3. left-hand slope $\neq 1$ 
4. References to Holstein & Swift
5. References without page nos but include page references
6. Reference to Kacser & independent measures of distance.
7. ~~Problem of Gottfried~~ problem of non-simultaneity.
8. Cylindrical spacetime. More details.
9. f.e. for paper files in reference.
10. ~~reference to volume to check~~
11. ~~reference to Bridgman~~

① The role of accelerated reference frames in explaining the twin's aging - is also ~~criticized~~ critically examined (A)

② ✓ footnote 10, 31-54 (1911)

③ ✓ Delete footnote 5.

④ ✓ Delete footnotes 12, 13, 14 — replace 12 in text by reference back to 4 on p. 3.

⑤ ✓ Delete last clause of para 1. on p. 4.

⑥ ✓ Insert 'd' on p. 4 para 3, line 1.

⑦ ✓ p. 4, comma after footnote 15, after E. F. Doolittle.

⑧ ✓ force we are dealing with flat spacetime, the reference to special relativity in this context is decidedly misleading. [footnote ~~the text~~ so in particular for discussion of this point see in particular, ^{Edward} E. F. Doolittle and R. S. Phillips, "Uniformly accelerated reference frames in special relativity", Am. J. Phys. 55, 252-261 (1987)]

⑨ ✓ change ref. 21 footnote 21 to Am. J. Phys. 57, 792-799 (1989).

⑩ ✓ Delete footnote 22

⑪ ✓ acceleration based

- (12) unblot on Quilbans
- (13) ✓ delete "Reubeloot ad."
- (14) ✓ check page refs for Wanne
- (15) ✓ Delete between square brackets on p. 7.
- (16) ✓ Delete footnotes 27 - 29.
- (17) check Wanne's eq. (5) on p. 7. M. 81-99
- (18) Insertion on Conventionalities:

5/ The conventionality thesis and the commitment
issue of whether it is possible, in a
non-circular fashion, to make a factual
measurement of the one-way speed of light,
has attracted considerable discussion in
both the philosophical and physics literatures.
For a detailed defence of the defence of the
upper ~~note~~ ²⁰²² to be made to Salmon and
d. Earlicson ²⁰²³, and also the comprehensive
review by Redhead ³.

[^{Footnote}
~~9~~
~~XX~~
~~2~~ : W.C. Salmon, "The philosophical significance
of the one-way speed of light", Notes 11,
253-292 (1973)

Isotopes 17. Erickson, "The Convertibility of Mechanization,"
Am. J. Phys. 53, 53-55 (1985).

3


Objections to the ether Conventionality thesis
take three main forms. Firstly the
loss of simplicity arising from the conventional
effects associated with using non-standard
synchrony. Thus Brehme writes ^{23, 24} "It can
be done, but it is so artificial as to
jar our sense of fitness".

[Ref. ^{23, 24} R.W. Brehme "Response to 'The
Conventionality of Synchronization'" Am. J. Phys.
53, 56-59 (1985)]

But the Conventionality thesis is an ideal,
not about simplicity, but about what
is fundamental and what is conventional in
the foundations of special relativity.

A more promising criticism is to
introduce methods of establishing distant
synchrony which do not depend on a
prior choice of the ϵ -parameter.

Much discussed in this connection is
the method of slow clock transport ^{24, 25} as
to introduced by Bridgman.

[Footnote ²⁵ P.W. Bridgman, A Sophisticate's
Primer of Relativity, ( , Middletown, Conn., 1962),
Wiley-Interscience Press, pp. 64-67.]

Introducing a notion of self-measured
velocity v (i.e. what is now usually called
proper velocity) Bridgman showed that
in the limit as $v \rightarrow 0$, slow clock-transport
agrees with the Einstein convention,
and is preserving it.

4

A similar line of argument has been developed by Brehme^{25b}.

[Footnote ^{25b} R. W. Brehme "On the Physical reality of the isotropic speed of light", Am. J. Phys. 56, 811-813 (1988)]

who also uses clocks moving in opposite directions and the same proper speed to establish distant synchrony in agreement with all fourteen conditions

stated, A more sophisticated line of argument²⁷ can be traced²⁶ to the work of Robb

[Footnote ²⁶ A. A. Robb, A Theory of Time and Space, (Cambridge University Press, Cambridge, England, 1914)]

Robb's work was 'rediscovered' in the 1960's. For a modern treatment see, for example, F. C. Zeeman, "Causality implies the Lorentz group", Found. Phys. 5, 349-363, (1964.)

The essential idea here is to note that the standard Einstein synchrony is equivalent to Minkowski-orthogonality to the time axis of the reference frame, and then to show demonstrably that Minkowski-orthogonality is definable from the causal structure of Minkowski-spacetime, i.e. the light-cone structure without any assumptions about the one-way speed of light.

Nevertheless the conventional story can

still be defined on the grounds that
any method that establishes standard
synchrony in a moving frame, will
automatically define non-standard synchrony
in a stationary frame, so the conventional
element is retained in specifying simultaneity
in the stationary frame, viz. the choice
of whether to insert into its place
the standard synchrony defined in any
of the moving frames, as the quality
candidate.

For the present we shall proceed on the
assumption ^{that} the conventionality thesis is correct,
and refer the reader for a comprehensive
review of this issue to Redhead³ p. 3.
the work cited in p. 3.

(19) By cylindrical space-time we mean a
two-dimensional universe in the shape of an
infinitely long cylinder, with time running
"up" the cylinder and space running
"around" it.

(20) This scenario has also been examined
by Redhead³ who has shown how
the parallelogram construction can be
adapted to spell ^{out} the conventionality limits
on synchronizing distant clocks in cylindrical
space-time.

(21) ✓ will → can may

F (22) is the standard formulation of the twin paradox

(23)

if the journeys of the twins are to start and finish in spatial coincidence (6)

(24)

at any rate

lg

it

It remains, then of course that without acceleration, in Minkowski space-time it is impossible to have ^{any} ~~any~~ interesting trajectories so as to formulate the twin paradox with the twins starting and finishing in spatial coincidence. So in this sense, acceleration is an essential ingredient in understanding the twin paradox. It may be noted, however that even this role for acceleration can be elucidated in formulations of the twin paradox in curved space-time ¹⁹³⁹ ~~1939~~ - see for example the discussion in Barry R. Holstein and Arthur R. Swift "The Relativistic twin in free fall", Am. J. Phys. 40, 746-750 (1972).